

**State of New Jersey**

DEPARTMENT OF ENVIRONMENTAL PROTECTION
SITE REMEDIATION PROGRAM
OFFICE OF BROWNFIELD REUSE
MAIL CODE 401-06A
P.O. Box 420
TRENTON, NEW JERSEY 08625-0420
[HTTP://WWW.STATE.NJ.US/DEP/SRP](http://www.state.nj.us/dep/srp)

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

Margaret W. Kelly, President
Standard Chlorine Chemical Company, Inc.
c/o Key Environmental, Inc.
Carnegie, PA 15106
Attn. Jim Zubrow

MAR 01 2012

David Rabbe, President
Tierra Solutions, Inc.
2 Tower Center Boulevard, 10th Floor
East Brunswick, New Jersey 08816

Mitchell Brouman, Project Manager
Beazer East, Inc.
c/o Three Rivers Management Company
One Oxford Centre, Suite 3000
Pittsburgh, PA 15219

NOTICE OF DEFICIENCY

Re: Hackensack River Study Area, Supplemental Remedial Investigation Workplan (SRIWP) for:
Standard Chlorine Chemical Company Site (SCC/116)
Diamond Shamrock Site (Diamond/113)
Koppers Seaboard Site (Beazer East)
1015 To 1035 Belleville Turnpike
Kearny Town, New Jersey 07032
SRP PI# G000001583 & G000008790 & G000001985
EA ID #: SUB080003

Dear Ms Kelly & Mr. Rabbe & Mr. Brouman:

The New Jersey Department of Environmental Protection (Department) acknowledges receipt of the January 29, 2009 document entitled "Hackensack River Study Area Supplemental Remedial Investigation Workplan (RIWP). The RIWP was submitted jointly (PRG) pursuant to paragraphs 36, 30, and 18 of the respective Administrative Consent Orders executed on October 20, 1989, April 17, 1990, and March 4, 1986 and the Technical Requirements for Site Remediation at N.J.A.C. 7:26E (Tech Rule). The NJDEP's technical review of the subject document included comments received from the US Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA). The NJDEP also requested the US Environmental Protection Agency (USEPA) to provide technical comments, however, USEPA has not offered any comments on the subject document, at this time.

Deficiencies

The Department has completed its review and determined that the Supplemental Remedial Investigation Work Plan dated January 2009 does not conform to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E and the Administrative Consent Orders dated October 20, 1989, April 17, 1990, and March 4 1986 and reflects the following deficiencies:

- Description of Deficiency: Failure to submit a Remedial Investigation Work Plan, including a baseline ecological evaluation, which conforms to the general requirements of N.J.A.C. 7:26E-4.2.

Technical Comments:

1. Section 3.0 Data Quality Objectives/3.1.2 DQO Step 2 –Identify the Decision/Supplemental Nature and Extent Characterization – This section must clearly state that a major project objective is the complete delineation of site-related contaminants in Hackensack River surface water and sediments. Surface water must be delineated to the more conservative of the human health-based or the aquatic-based surface water remediation standards/criteria, or background, whichever is higher. Sediments must be delineated to the higher of the sediment screening criteria or background contaminant levels. Table 6-7 from the Hackensack River Study Area Remedial Investigation Report –Revision 1, December 2008 should be refined for the selection of site-related contaminants of ecological concern; justification for the elimination of contaminants from this list must be provided.

2. Section 3.0 Data Quality Objectives/3.1.2 DQO Step 2 - Identify the Decision /Baseline Ecological Risk Assessment - As a further line of evidence for evaluation of the benthic invertebrate/epibenthic assessment endpoints, this section as well as Section 4.3 Baseline Ecological Risk Assessment (BERA) must include laboratory bioaccumulation studies on a subset of samples to evaluate exposure of estuarine bivalves to peninsula sites' contaminants since, unlike fish, these species tend to accumulate high levels of certain contaminants, such as PAHs, due to their inability to metabolize and excrete them. In addition to assessing bioavailability and tissue residue effects, these data will be used in food chain exposure models. Bioaccumulation studies are routinely included with ecological risk assessments for NJDEP sites and USEPA Region 2 Superfund sites, such as the Horseshoe Road Superfund Site, Kin-Buc Landfill, Study Area 7 Site on the Lower Hackensack River, and will be conducted for the Passaic River 17 Mile Study.

NJDEP highly recommends conducting fish early life stage (ELS) toxicity tests on a subset of Hackensack River sediment samples. The use of this test is directly applicable to the Hackensack River project in support of the assessment endpoint for the protection, survival, growth, and reproduction of fish populations, especially since dioxin is elevated above screening criteria and background levels at certain locations and dioxin is documented to cause adverse effects to fish embryo and larval stages (e.g., Cooper et al., 1993)¹. Since the fish ELS test specifically examines dioxin toxicity to fish receptors, the inclusion of this test is appropriate. ASTM E 1241 should be modified for sediments based on ASTM Methods E 1706 and E 1367, using mummichog in place of the ASTM species. Further information regarding mummichog biology can be supplied to Arcadis. This test will be required for the Passaic River 17 Mile Study.

3. Section 3.2.3 Baseline Ecological Risk Assessment–Toxicity Reference Values (TRVs) and Critical Body Residues (CBRs) will be developed and provided to NJDEP in a memorandum for review and approval prior to conducting the BERA. This is acceptable and NJDEP requests that the same technical memorandum include further details on the food chain exposure models, i.e., the specific surrogate species and exact information on how area use factors (AUFs), seasonal use factors (SUFs),

incidental sediment ingestion, and dietary composition will be managed for these species. For example, the Responsible Parties (PRG) have been advised that that NJDEP and USEPA Region 2 considers foraging range more appropriate than home range for the development of AUFs. Avian species, for example, may travel a great distance from a nesting site but forage in a relatively small area. Also, since to the extent possible a surrogate species selected for a BERA should represent sensitive year-round residents for that particular feeding guild, and since migration behaviors are variable, dose calculations using an AUF/SUF of 1 must be presented concurrently with calculations using fractional values. Regarding dietary composition, if the diet is proportioned among multiple components, the PRG must specify how dietary components without chemical analysis will be incorporated into the model. For example, if 13% of the Belted Kingfisher diet is crayfish (as per USEPA 1993² for a southwest Ohio habitat) and only fish tissue data are collected, NJDEP's policy is that it cannot be assumed that crayfish component of the diet is not contaminated. A sample dose calculation should be included in the technical memorandum.

4. Section 3.2.3.4 Exposure Point Concentrations – it is implied that contaminants with a frequency of detection of less than 10% will be not be included in the risk assessment. It is: USEPA Region 2 and NJDEP/SRP policy that frequency of detection must not be used to cull contaminants of potential ecological concern (COPECs), since contaminant hotspots could be missed. NJDEP requests that Arcadis review the data to ensure contaminants with highly elevated levels but a low frequency of detection are not excluded.

5. Sediment Quality Guidelines – It is unclear if the issue of selecting a sediment screening criterion for 2,3,7,8-TCDD has been resolved and whether Arcadis intends for the references provided in this section to be applicable to dioxin. It was stated in the Hackensack River Study Area Remedial Investigation Report –Revision 1, December 2008 and the response to comments letter, December 19, 2008 (M. Brouman to C. Kanakis and F. Faranca), that a criterion for dioxin would be provided in the BERA work plan. In those prior documents, the PRG presented justification for not concurring with NJDEP's recommendation to use 3.6 ppt 2,3,7,8-TCDD from the NOAA Screening Quick Reference Tables (SQuiRT)³ as the sediment screening criterion, and stated that, as agreed to at the October meeting, the SLERA will not be revised and the criterion will be selected for the BERA. NJDEP concurred with postponing the criterion selection, but again, the criterion is not specifically proposed herein. NJDEP reaffirms prior comments that NOAA SQiRT value is within the range of generally available criteria for 2,3,7,8-TCDD. As previously stated by NJDEP, there are no firmly established sediment screening criteria for dioxins, however, levels less than 10 ppt are generally cited by regulatory agencies for aquatic ecosystem health and protection. Various groups (regulatory agencies and others) have developed sediment guidelines using a variety of methods, for example, the equilibrium partitioning approach, tissue-residue-based guidelines, background considerations, etc. The method selected depended on the site-specific goals and/or the protection of specific endpoints of concern, such as fish, birds, mammals, or the benthic community. Guidelines derived for dredge spoil disposal/management at off-shore locations have typically equated to sediment levels in the low ppt range (1-10 ppt).

The USEPA published "Interim Report on Data and Methods for Assessment of 2,3,7,8-Tetrachlorodibenzo-p-dioxin Risks to Aquatic Life and Associated Wildlife," March 1993. Through this report the USEPA presents a review of available research and methods for assessing dioxin risks to ecological receptors. For sediments, two risk level categories are presented. The first category is referred to as Low Risk and represents the highest concentration that is unlikely to cause significant effects to sensitive organisms. The second category is referred to as High Risk to sensitive organisms and represents the lowest exposure concentration that will likely cause severe effects. The Low Risk sediment levels are 60 ppt for the protection of fish, 2.5 ppt for the protection of mammalian wildlife, and 21 ppt for the protection of avian wildlife. The High Risk sediment levels are 100 ppt for the protection of fish, 25 ppt for the protection of mammalian wildlife, and 210 ppt for the protection of avian wildlife. For

State cases where dioxin is present in sediments, 2.5 ppt, the Low Risk sediment screening criterion for the protection of mammalian wildlife, is routinely used. NJDEP considers the sediment criteria used for the Lower Passaic River Restoration Project Focused Feasibility Study⁴ to be applicable to the HRSA, where the 2,3,7,8-TCDD sediment Preliminary Remediation Goals (PRGs) are 3.2 ppt for the protection of the benthos and 2.5 ppt for the protection of wildlife. The PRG should clarify their selection of a screening criterion for 2,3,7,8-TCDD in the technical memorandum or revised SRIWP.

6. Section 4.1 Supplemental Nature and Extent Sampling, (p.4-6) 4.3.2 Surface Sediment Sampling and Processing, and Figure 4-1 – the work plan consists of six surface chemistry/sediment triad/fish/crab locations in mudflats, nine 4-ft sediment core locations, four of which are also sediment triad locations, and one 20-ft core at mudflat 5. NJDEP notes that no fish/crab locations are proposed for the west bank adjacent to the three sites (the locations in Mudflats 7 and 5 are considered offsite), therefore sediment core/triad locations 064 (apparently at the SCCC North Outfall 16) 065, 068, and 072 should have fish/crab tissue added. To afford better coverage in Mudflat 11, at least two additional 4 foot cores/sediment triad/fish/crab locations should be added adjacent to the SCCC lagoon (suggested at TPS-B1-1 where highly elevated Naphthalene was detected) and at the South Outfall 15. Using the remedial investigation and other prior data, the biological sample locations must attempt to cover high, medium, and low levels of site-related contaminants, targeting areas of documented elevated site related contaminants, such as HRWC-11 for chromium/hexavalent chromium, SD-02 and SD-09 for 2,3,7,8-TCDD equivalents, and SD-02 and SD-06 for naphthalene/PAH (for illustrative purposes only; data must be consulted). A table describing the justification for each sample location must be submitted.

7. Section 4.1 Supplemental Nature and Extent Sampling - Paragraph 3 states delineation “sampling will start at the locations where oil-like substance was previously observed (RI Cores 011, 012, and 013).” NJDEP recommends initial sampling should also start along the perimeter of the Interim Remedial Measures (IRM) area where coal tar was identified in sediments adjacent to the former Koppers Seaboard site in the Mudflat 8 area. This work plan should include a summary of activities and findings of the IRM (e.g., amount of coal tar-contaminated sediments removed, description of physical characteristics of these sediments, vertical and horizontal extent of coal tar within 50' X 3' excavation area, etc.) as additional justification for the selection of initial delineation sample locations. Further, text on p. 4-3 states “Oil-like delineation sediment cores may be segmented for laboratory analyses.” The revised work plan or technical memorandum must be revised to state that delineation samples will be laboratory-analyzed for TEPH, PAHs, TOC and particle grain size.

8. Section 4.3 Baseline Ecological Risk Assessment – The revised SRIWP or technical memorandum should provide a table with testable risk hypotheses or questions for the BERA, assessment endpoints with corresponding specific measurement endpoints, specific receptor species, and biological and media data to be collected.

9. Section 4.3 Baseline Ecological Risk Assessment/4.3.1 Shoreline Habitat Characterization – key habitats/ecological features associated with the 3 sites must be targeted. For example, the condition, contaminant levels, and contaminant migration potential in the ditch between the Koppers and SCCC sites must be addressed.

10. Section 4.3 Baseline Ecological Risk Assessment/4.3.2 Surface Sediment Sampling and Processing - The first paragraph states surface sediment samples will be collected from 5 mudflats and four subtidal sample locations. This is not consistent with NJDEP's understanding of the field sampling plan (paraphrased in comment 6 above), that nine sediment cores will be collected and, as per p.4-2, the 0-5' interval will be sampled in each. This should be clarified in the revised SRIWP or technical memorandum when the final number of samples is decided.

The second paragraph states that surficial sediments will be analyzed for acid volatile sulfides (AVS), simultaneously extracted metals (SEM). NJDEP had previously commented that it has been the policy of the Site Remediation Program that, while AVS/SEM results may aid in interpretation of biological studies, elevated metals will not be permitted to remain in sediments based on this test, since flood events, excavation, etc., cause sediment disturbance and volatile sulfide oxidation, potentially releasing a "slug" of metals to the environment. While AVS is effective in binding divalent metals in anoxic sediments, it is generally less applicable to the more oxic conditions in the upper 2 cm of sediments, considered the primary biotic zone (benthic organisms require oxygen and would not be present in its absence). Additionally, use of the AVS/SEM approach requires that the sediments are never disturbed or changed from the parameters examined to make the ratio calculations.

11. Section 4.3 Baseline Ecological Risk Assessment /4.3.4 Biological Tissue – Instead of targeting a specific benthic invertebrate (i.e., blue crab), NJDEP recommends collection of the variety benthic organisms of the appropriate size class that may be present at each station. For example, juvenile blue crab, large insect larvae, crayfish, snails, grass, shrimp, etc. would all be appropriate forage items for analysis. Various collection methods may be needed.

12. Section 4.3 Baseline Ecological Risk Assessment/ 4.3.4.1 Fish Tissue – while text and Figure 2 in SOP-11 address external physical examination of fish for gross morphological abnormalities, internal histopathological examination must be conducted where internal and external gross abnormalities are observed as well as a subset of all fish regardless of observable gross abnormalities; certain peninsula site contaminants are known to be associated with histopathological effects on fish, and these data will support the assessment endpoint for growth, survival, and normal development of fish.

13. Future figures must clearly label the three peninsula sites.

14. Sections 1.1, 3.1.1, and 3.1.2: This DQO must be restated as the completion of the horizontal and vertical delineation of all site contaminants in surface water and sediment, not to just supplement the nature and extent of the site characterization of sediment contaminants. If additional surface water sampling is not needed based on previous sampling results and approvals from the NJDEP, then revise the SRIWP to clearly explain and justify why additional surface water sampling and analyses are not needed. However, if this is the case, then due to the long period of time that has passed since possible previous surface water sampling and analyses were completed, NJDEP recommends that this work plan be revised to include surface water sampling and analyses to confirm that the sites are currently not resulting in contamination of surface water from direct site discharges or from sediment contamination. If this is not the case, then revise to include surface water sampling and delineation. Surface water samples must be collected at low, high, and slack tides pursuant to N.J.A.C. 7:26E-4.5(d)2i(5) from the water surface, just above the sediment surface, and within the water column where appropriate based on water column depth and tidal mixing zones. N.J.A.C. 7:26E-4.2(b)

15. Sections 3.1.4, 3.1.5, 3.2.1, 3.2.2, 3.2.3.4, and 4.1; Figures 4-1 and 4-2: Revise to justify the arbitrary limits of the study boundaries. Horizontal and vertical delineation of site contaminants shall continue until all site contaminants are delineated to the applicable remediation standards and criteria. Delineation may need to be accomplished for individual contaminants by establishing a gradient from the sites to lower concentrations in the river (focusing on migration of contaminants to depositional areas upstream and downstream of the sites due to tidal redistribution of contaminant discharges from the sites), particularly due to the difficulty in finding suitable background/reference areas in the river as detailed in the NJDEP and NOAA comments. Additional sample locations and depths will be needed to accomplish this requirement, particularly adjacent to the sites, as exemplified by the additional areas of free and residual product encountered during the sediment excavations along the Koppers Site. NJDEP recommends sample locations every 100 feet along the Koppers site boundary with delineation sample

locations extending into the river at 50-foot intervals as shown on Figure 4-2 but extending along the whole length of the Hackensack River Study Area (HRSA) for contaminant specific as well as free and/or residual product delineation. N.J.A.C. 7:26E-4.2(b)

16. Section 4.3.2: Collection of just surface sediment samples is not acceptable. All sample locations must consist of cores so contaminants at each location can be vertically delineated. Due to reworking of sediment from tidal action, shipping, storm events, dredging, etc., deeper sediments may become surface sediments and result in new biologically active zones. N.J.A.C. 7:26E-4.2(b)

17. Sections 4.1 and 4.3.1: Revise to justify the arbitrary use of prespecified sample locations and sample intervals. In addition to prespecified sample intervals, samples must also be collected from other intervals or the prespecified intervals must be adjusted based on sediment specific characteristics in each core, such as PID readings, odors, visual indicators of contamination, colors, and changes in grain size or stratigraphy with these criteria listed in the revised SRIWP. Sample locations must be adjusted and added based on the shoreline observations of habitat, potential point source discharge locations (outfalls and site drainage points), and depositional patterns due to river tidal flow, which must be discussed in the revised SRIWP.

18. Section 4.1.1: Revise to require multiple core collections at individual sample locations as necessary to obtain sufficient sample volume or mass for the specified sediment analyses at each depth where samples will be collected. One core will not be able to obtain a sufficient volume or mass of sample for all the planned analyses, including what is needed for QC samples (i.e., MS/MSD and field duplicate).

19. Sections 4.1 and 4.1.1; Table 4-4: Revise to clarify that sediment samples will be collected from a 6-inch increment within each core interval listed on Table 4-4. The sample collection intervals within each core interval may be different for various types of contaminants (free product versus VOCs versus chromate waste, etc.). If more or less than a 6-inch increment is collected, an explanation must be included in the field documentation for inclusion in the RI report.

20. Section 4.2: Compositing of sediment samples is prohibited except for waste classification purposes.

21. Section 4.4.2: Revise to clarify and justify the number of tide gages to be installed and explain how they will be used.

22. Section 4.4.4: Revise to detail how the vertical locational information (elevation in mean sea level) will be determined for the surface water and sediment samples.

23. Section 4.4.5: If surface water samples are collected for hexavalent Cr analysis, the sample bottles must be rinsed first with sample to ensure that any acid residuals from bottle cleaning are removed and to quench adsorption sites on the bottle surfaces, as no preservatives are added to water samples collected for hexavalent Cr analysis.

24. Sections 4.5, 7, and 7.1; Tables 4-9 and 7-1: Field rinsate blanks are not required for the sediment sampling and are of minimal value for this matrix.

25. Section 4.7: If surface water samples are collected, revise this section to address surface water samples.

26. Sections 4.5, 7.2, and 8.5: Revise to require the collection of and use by the laboratory of site samples for all QC analyses that require a field sample (e.g., MS/MSD), which is especially critical for the hexavalent Cr analysis. The data verification, validation, and usability requirements must be revised to incorporate this requirement.
27. Section 5.2.5: Revise to include affirmative documentation that each laboratory has the applicable certification for each analytical method and analyte.
28. Section 6.3: Any modification to an analytical method requires the laboratory to obtain certification for the modification pursuant to the NJDEP laboratory certification regulations at N.J.A.C. 7:18-2.8. In addition, all alternate test procedures also require laboratory certification pursuant to N.J.A.C. 7:18-2.20. Revise this section to explicitly state that these regulatory requirements will be met.
29. Section 6.4 and Tables 6-1 through 6-11: Revise to indicate and require that all SQLs/MDLs will, at a minimum, result in data reported at levels low enough so compliance can be determined with the applicable remediation standards and criteria.
30. Section 6.2.3: It is not clear how QC samples can be used to determine whether the data are representative of site-specific conditions, which is usually determined by the sampling design and methods used to collect samples representative of site conditions. Revise to clarify what QC samples will be used for this purpose and how the QC data will be evaluated to judge representativeness.
31. Section 7.2.4: Revise to discuss the specific predigestion soluble and insoluble spiking and postdigestion spiking requirements and QC criteria for the analysis of the sediment samples for hexavalent Cr by Methods 3060A and 7199. In addition the NJDEP requires (1) all samples analyzed for hexavalent Cr to also be analyzed for pH and Eh, not just the sample used for the predigestion spikes, (2) all samples in an analytical batch to be redigested and reanalyzed when any of the predigestion spike recoveries are outside the 75%-125% QC limits, and (3) the full data deliverables for the hexavalent Cr data to include plots of the Eh versus pH results for each sample on the graph included in Method 3060A.
32. Section 8.2.2 and 8.3: Revise to discuss and clearly specify the data deliverables formats for all data. Full data deliverables are required for all dioxins/furans and hexavalent Cr data for all media.
33. Section 8.5.2: Revise to use the NJDEP data validation SOPs and forms for analyses where the NJDEP has such SOPs, rather than USEPA guidelines, as the data is being submitted primarily for compliance with the NJDEP Technical Requirements for Site Remediation (N.J.A.C. 7:26E).
34. Section 8.5.3: Revise to discuss the data usability assessment of hexavalent Cr data based on the evaluation of sample-specific oxidizing versus reducing conditions pursuant to the Method 3060A and NJDEP requirements.
35. Section 10: Revise to clarify that a complete remedial investigation report will be submitted that incorporates all previous investigation results from all three sites, including the December 2008 report, not just the results of this SIRWP.
36. Table 6-12: Revise to delete Method 3060A from the Water column for the hexavalent Cr analysis, as water samples are not digested prior to analysis by Method 7199.
37. Table 6-12: If surface water samples are collected, revise to include water methods for the pH and ORP analyses.

38. Table 6-12: Revise the Method references so that the most current version of the methods are listed and used. For example, SW-846 Method 7471A is listed for mercury, but the most current version is SW-846 Method 7471B.

39. Appendix A: If surface water samples are collected, revise to include a SOP for the collection of surface water samples.

40. Appendix A, SOPs No. 6 and 13: Section 2.2.6, item 2, in SOP 6 seems to conflict with the requirements in SOP 13. Excess sediment should not be returned to the river but collected for proper disposal in accordance with SOP 13. Revise SOP 6 and any other SOPs to conform to the handling and disposal requirements in SOP 13.

Corrective Actions

To correct these deficiencies please take the following actions or make the required submittals within the timeframes indicated:

- Submit a Revised Remedial Investigation Work Plan within 45 days after receipt of this notice that is in accordance with N.J.A.C. 7:26E.

Note that if deficiencies included herein are not addressed to the Department's satisfaction within the specified time period the Department may assess penalties pursuant to the provisions of paragraph 65 of the October 20, 1989 ACO, paragraph 65 of the April 17, 1990 ACO and paragraph 24 of the March 4, 1986 ACO.

If you require copies of Department Guidance Documents or applications, many of these are available on the internet <http://www.state.nj.us/dep/srp>. If you have any questions regarding this matter, please contact Christopher Kanakis at (609) 633-1460, prior to the date indicated.

Sincerely,



Christopher Kanakis, Senior Project Manager
Office of Brownfield Reuse

C: Timothy Bartle, Bureau Chief
Steve Maybury, Bureau Chief
Gwen Zervas, BCM
Alison Hess, USEPA
Reyhan Mehran, NOAA
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